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Public Drinking Fountains in Cities.

[This is a subject that has before been brought up in these columns, attention being called to the fact that the very few sparsely-scattered drinking-fountains in New York, are almost always (possibly sometimes by accident, though usually by design) broken or out of order; the result being of eminent advantage to the beer-shops and bar-rooms which form so powerful, indeed so predominant an element in the life of this great Metropolis. The following remarks, taken from one of our city newspapers, are well worthy of perusal and preservation, as covering nearly the whole ground of the subject.—Ed.]

"There is no feature of public usefulness and adornment which has received less attention in New York, in proportion to its value, than the institution of public fountains in our crowded thoroughfares. There is perhaps no city in the world where there are greater facilities for water supply and natural drainage, and yet, in proportion to its population, it is difficult to recall to mind one which has been more thoroughly neglected in this particular. We have only to take a glance at the Old World to see how immeasurably inferior we are to many other cities in the convenient supply of pure drinking water to our population. In Cairo, Damascus, Constantinople, and other Mohammedan cities, in old Rome and all the leading cities of Italy, throughout Germany, Belgium, Holland, and other parts of continental Europe there is scarcely a town to be seen, scarcely a large village, that is not provided with its public fountains and troughs for the accomodation of man and beast, many of them so constructed as not only to be of use in refreshing thirst, but of such exquisite artistic design as to add immensely to the attractive beuty of the localities in which they are placed.

"Rome is in this respect a perfect marvel of beauty. At every few steps the traveller comes upon some splendid fountain, pouring forth its water in most lavish profusion from the midst of richly-carved marble or bronzed figures representing mermaids, seahorses, shells, and other aquatic features. Each of these fountains bears its own appropriate name, and form together one of the most charming features, which leave an impression upon the minds of all who have visited that wonderful city.

"In this country such public manifestations of the commingling of the useful and beautiful in art are very rare. Here and there—as in the case of the magnificent Probasco fountain in Cincinnati—we find some individual of taste and wealth who, improved by the impressions he has received abroad, is liberal enough to present to his fellow citizens a gift which he has found attended with such great benefits elsewhere. But neither private liberality nor public enterprise has seemed hitherto to view the question with the attention it merits. While it is desirable that fountains when erected in our thoroughfares and public places should be made models of beauty, it is desirable in the first place that we should have fountains of some kind, and in abundance; places where, at every block or two, the thirsty pedestrian can in heated terms like the present refresh himself, and troughs where horses and dogs can cool their burning tongues. We have such things in New York, but they are altogether inadequate in number, and should be almost as frequent as our street letter-boxes.

"It is impossible to tell to what extent we might reduce intemperance among our people if each man had such a ready means at every step for alleviating his thirst instead of going to the gin-mill, nor how much suffering and disease might be spared among animals, especially beasts of burden, if they had such frequent opportunities for refreshing their jaded bodies.

"The best way of reaching this desirable object seems to be by united action among individuals. In London a fountain association has for a short time past existed, which depends entirely upon private support. According to their latest report they had erected 123 fountains and 125 troughs, and good as this beginning is it is found altogether inadequate to the wants of the vastipopulation. In the space of five hours 2,000 people have been seen to drink at one fountain and 7,000 at another in one day; and it is estimated that 500,000 people drink daily from the public fountains of London. So much are these things prized by all classes that no injury has ever beeh known to occur to any one of them by the mischievous or evil minded.

"But we need not go out of our own country for examples when our sister city of Philadelphia furnishes already so good a model. The "Philadelphia Fountain Society" was incorporated on the 21st of April, 1869, and its projector, Dr. Wilson C. Swann, elected president over a board of managers which included twenty-six of the most respectable ladies and gentlemen of that city. They commenced by soliciting annual contributions, and with only a small fund on hand, at once set to work erecting troughs and fountains. In the first year they erected twelve fountains, in the next year twenty more, and the good work is still progressing. Last summer there were thirty-two fountains in full play in Philadelphia, yielding, of course, incalculable relief to thousands. Apart from the luxury of these objects, the effects already resulting from them, in a sanitary and moral point of view, are very striking. Since their establishment the retail of ardent spirits has been actually broken up in some neighborhoods; and while—previous to the location of horse-troughs—twenty horses have been known to die in a single day in Philadelphia, from heat and exhaustion, last year only one was known to die from those causes.

"It is to be sincerely hoped that the good example of Philadelphia will not be lost upon New York, and that similar fountain associations will spring up here and in other cities of the Union. As a means of endearing himself to his fellow citizens, it is impossible to conceive a more welcome and graceful present to his native city from any man of wealth than a handsome public fountain. But what may be beyond the reach of individual liberality is clearly within that of associations, and when they have gone as far as they can it is the unquestionable duty of our municipal authorities to see that we are abundantly provided with these attributes of health and comfort which, at certain seasons of the year, are almost as indispensable to our well-being as the use of sewers and gas-lamps.

The Greatest Gas Well in the Oil Regions.

The Newton well, on the Nelson farm, six miles north of this city (Titusville, Pa.) has been down about twenty days, and has continuously poured forth such a volume of gas that it was found impossible to pump it, as the valves would not work. The tubing was pulled Wednesday, and the well was cased in order to let the gas blow off, so that it might be pumped. After the casing was put in, the sand pump was lowered for the purpose of agitating the well, and the gas raised a column of water, throwing a solid stream into the air a hundred feet. The noise was terrific, and could be heard for a distance of more than two miles. The noise was something like the loud roar of thunder, and when the column burst at the top, it threw the water each way for fifteen rods, from the well. The water was exhausted in about twenty-five minutes, and then a column of gas followed, rising with tremendous force fifty feet from the derrick. The outpouring of the gas makes a roaring noise that can be distinctly heard for two miles from the well. The noise around sounds like the rushing of a whirlwind. The column can be seen a mile from the well. No tools can be put into the well. As soon as the attempt is made, with such force does the gas come out that the tools are carried into the air. From descriptions of eye witnesses, this is probably the greatest gas well ever struck in the oil region. Up to last evening the gas showed no signs of being exhausted. The people in that vicinity are very much alarmed, and the cattle run about the fields perfectly wild with fright.—*N. Y. Sun, July 5.*

In eighteen months, four dealers in England have sold hydrate of chloral enough to put 36,000,000,000 people to sleep.—*American Artisan.*

Chemical Repertory.

No. 72.—July 16, 1872.
EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

368. To Soften Putty.—It is well known that the common putty, with which glass window-panes are fixed in their frames, is made of powdered chalk and linseed-oil. When old, it becomes so hard that, in case its removal is necessary, a chisel and hammer must be resorted to. In fact, it becomes like a stone, harder than the wood itself, pieces of which often break off unless peculiar care is taken in removing the putty. This hardness becomes a serious inconvenience when a large pane, say of valuable plate-glass, has to be removed for the purpose of repairs in the wood work, or from some other cause. Here the use of chisel and hammer on the putty surrounding the glass may cause serious damage along the edges, or even total fracture. An agent to soften the putty in such cases, so that it may be removed with ease, is therefore of some value. This may be effected with a paste of caustic potash, easily prepared by mixing the caustic alkali, or even carbonate of potash or soda, with equal parts of freshly burnt quick-lime, which has previously been sprinkled with water, so as to cause it to fall into powder. This mixture is then mixed with water to a paste, and this is spread on the putty to be softened. Where one application is not sufficient, it is repeated. In order to prevent the paste from drying too quickly, it is well to mix it with less water, adding some soft soap instead.—*Dr. Van der Weyde.*

369. Cheap Oxygen.—The following sentences are quoted from Prof. Joy, as interesting in connection with the *ignis fatuus* (so far) which has been called by us elsewhere *Oxhydrism:*

"Although nearly one hundred years have elapsed since Priestley announced the discovery of what is now known as oxygen gas, and although chemists agree in saying that one half, if not two-thirds, of the actual weight of the world is made up of this gas, we find the tacit admission implied in the large prize offered for 1872, that even at the present time we have no cheap and econonomical method for the preparation of oxygen. Many methods have been proposed and many tried, but the conviction still obtains that the problem has not yet been solved. So, also, with the use of the nitrogen of the atmosphere for manufacturing purposes. For the production of Prussian blue, we obtain our nitrogen from animal matter; why not from the air? It is believed that ozone is capable of extensive use in the arts, could we make it cheaply, hence the offer of a prize relating to it."

370. Glue to Withstand Fire.—Of course it depends upon the fire; but here is the prescription:—Mix a handful of quicklime in four ounces of linseed oil, boil them to a good thickness; then spread it on tin plates in the shade, and it will become exceedingly hard, but may be easily dissolved over the fire, and used as ordinary glue.

371. Water for Manufacturers.—The question of water is of extreme importance; thus, waters containing lime, dissolve soap with difficulty, render the orange colors more yellow, and turn cochineal and madder red purple. Barreswil said: "The foreign substances suspended or dissolved in the water, render the substance which we prepare impure, or spoil it altogether; it may tarnish or spot the goods which we endeavor to cleanse by scouring; it may modify or ruin the color of the tissues, or change the character of the mordant; it may retard evaporation, and thus cause loss of fuel or change of material. It will, consequently, be admitted that it possesses great interest to manufacturers to know the nature of the impurities which the water contains, and also the means of purification adapted to their wants."

There are few cases in which water is largely used in any manufacture, wherein an ingenious chemist cannot indicate to the manufacturer, after thorough analysis and examination, how to proceed so as to obviate the detrimental influences of impurities. This is a subject almost utterly neglected in America thus far.

372. Good Gracious!—Mr. James Bruce writes to the London *Mechanics' Magazine*, "that if the white strong heat of a galvanic battery be applied 'suddenly' to two ounces of wood ashes, or to three of coal ashes, the explosive force will be terrible beyond measure; but far more awful with 'calamine' *per se*, or in the following admixture: Pit-coal ashes, 3 parts; wood ashes, 2 parts; manganese, 6 parts; fluate of lime, 1 part; mix well."

373. Lofty Conceptions.—This we take from that profoundly scientific publication *All the Year Round.* We shall have to consult a "medium" about it, but fear it is one of those cases which Lord Dundreary says, "a fellah *can't* understand:"

"We can readily conceive that, above our atmosphere of oxygen, azote, and watery vapor, there exists another excessively light atmosphere, perhaps a couple of hundred miles thick, composed of the very lightest gases, especially of hydrogen. This is rendered more probable by the composition of air, which differs essentially from that of water. Water consists of two gases chemically combined, and when once combined, extremely difficult to separate, whereas air is only a mixture of gases no more combined than oil, water, and quicksilver stirred together in a pot. Happily for us, winds and tempests keep stirring these elements; but where they can find a place of rest they are porfectly at liberty to part company."

374. Gas-Light Glare Over Towns.—La Cour, of Copenhagen, makes the following assertions: When the sky is very dark and cloudy there appears over every large town a very red stripe of light, which is caused by the clouds hanging over the town reflecting the many gaslights. The height of this stripe varies very considerably. When it appears with a sharply-defined contour, then the smoke cloud is even and the lower strata of air are clear; under other circumstances, the edges of the stripe are either undefined or completely irregular. In the last case it will be seen, by the gradations of color in the rest of the sky, that it is overcast with isolated clouds of various altitudes. The phenemenon will then present an appearance closely resembling the aurora borealis. At one moment a shadow darts across the light, and it will then appear that this is caused by a lower cloud being projected towards the others. The next moment the original appearance of the stripe will change to some fantastic figure, perhaps the next moment to become enveloped in complete darkness. LaCour, by means of these phenomena, proposes to determine the height of the coherent strata of clouds, for the higher the stratum is in the vault of heaven, the higher in the horizon the surface of light (the light stripe) will appear. It may thus be presumed that there is a close connection between the height of the strata of clouds, their motions, and the state of the weather, so that it may be possible, by making use of La Cour's method either by day or night, to obtain a telegram from the clouds giving a reliable hint as to the state of the weather.

375. Phosphorus Vapor as a Reducing Agent.—It has long been a familiar fact, that when a jet of hydrogen is directed against paper previously impregnated with any salt of silver, the latter is reduced to the metallic state, while the paper becomes thereby blackened.

B. Renault has informed the Academy of Sciences that instead "of hydrogen gas, carbonic acid or nitrogen may be used which has been passed over lumps of phosphorus (which is absorbed and carried in the state of vapor along with these gases in very small quantity; the author found in a litre of carbonic acid gas, at temperatures of 4°, 15°, and 17°, from 0.8 m. grm. to 1·2 m.grms. of phosphorus), and it will then even blacken carbonate of copper. The author then gives a detailed description of the manner in which this property of hydrogen and vapor of phosphorus may be applied for the production of writing and other tracings upon paper.

376. Cement for Vulcanized (?) Rubber.—We find the following in our exchanges, have not tried it, but advise a trial:

"As rubber plates and rings are nowadays used almost exclusively for making connections between steam and other pipes and apparatus, much annoyance is often experienced by the impossibility or imperfection of an air-tight connection. This is obviated entirely by employing a cement which fastens alike well to the rubber and to the metal or wood. Such cement is prepared by a solution of shellac in ammonia. This is best made by soaking pulverized gum shellac in ten times its weight of strong ammonia, when a slimy mass is obtained, which, in three to four weeks will become liquid without the use of hot water. This softens the rubber, and becomes, after volatilisation of the ammonia, hard and impermeable to gases and fluids."

377. Saffranine.—There has been some inquiry in this country as to how this new and beautiful coal-tar color was formed. C. Mene has lately published the following formula:

"Two parts of nitrite of aniline and one part of arsenic acid are heated together for five minutes to from 80° to 120°; the contents of the vessel in which this operation takes place are poured into boiling water, and the fluid neutralised with lime. The liquid which turns a beautiful red color, is filtered through flannel, and the filtrate is next added to chloride of sodium in the proportion of five times the quantity of the nitrite of aniline used. The result is the precipitation of the new coloring matter, which is named saffranine, collected on a filter, and next submitted to pressure to remove water. Saffranine is used instead of safflower for dyeing wood and silk.

378. The Re-lie-able Gentleman Again.—He has now gone to, or at least passed through, Sullivan Co., New York. Witness the following:

"The water in White Lake, Sullivan County, has receded several feet in the past three days, and is still rapidly sinking."

Denied *in toto*, as usual, the next day.

379. Lactometer.—The *American Artisan* tells us that Gail Borden, of White Plains, N. Y., whose name is so famous in connection with condensed milk, etc., has been making some experiments for the purpose of determing the correct weight of crude milk. He took the milk of several cows, and, mingling it together, and then thoroughly cooling it, he carried it directly to the "U. S. Sealer of Weights and Measures," who measured and weighed the milk by accurate government weights and measures. The result was that a quart of milk, so measured and weighed on delicate scales, was equal to two pounds two ounces and one-quarter of an ounce (2 lbs. 2¼ ounces). The tests were made with different samples of milk at different times, but without materially altering the weight. Mr. Borden has adopted the above as a true weight of a quart of milk having a fair average quality. Hence any person who buys milk may determine by weight, with satisfactory accuracy, whether he receives a quart when he is required to pay for that quantity.

380. Preserving Meat and Vegetables.—Patent of A. S. Lyman, New York City, April 30.—This inventor claims the process of concentrating meat, fruit, or vegetables by alternately warming in the air and cooling by rapid evaporation in a nearly perfect vacuum.

381. Colors and Health.—Through the *American Artisan*, we learn that a correspondent of the *Builder* makes statements, which, if not founded on imagination, are certainly highly important. He had occasion for several years to examine rooms occupied by young women in a manufacturing establishment, and he observed that while the workers in one room would be very cheerful and healthy, the occupants of a similar room, who were employed on the same kind of business, were all inclined to be melancholy, and complained of a pain in the forehead and eyes, and were often ill and unable to work. The only difference he could discover in the rooms was that the one occupied by the healthy workers was wholly whitewashed, and that occupied by the melancholy workers was colored with yellow ochre. As soon as the difference struck him, he had the yellow ochre washed off the walls and then whitened. At once an improvement took place in the health and spirits of the occupants. He pursued his observations and experiments, not only in large manufactories, but also in small apartments and garrets, and he invariably found that the occupants of such apartments, when they were colored yellow or buff, were less healthy than their neighbor in whitened rooms, and that when the yellow hue disappeared the low spirits and ill health went with it.

382. To Prepare Skeleton Leaves.—A method, other than by the employment of water alone, is given by the *Druggists' Circular*. A solution of caustic soda is made by dissolving three ounces of wasing soda in two pints of boiling water, and adding one and one-half ounces of quick lime, previously slaked! boil for ten minutes, decant the clear solution and and bring il to the boil again. During ebullition add the leaves; boil briskly for some time—say an hour—occasionally adding hot water, to supply the place of that lost by evaporation. Take out a leaf, and put it into a vessel of water, and while there rub it with the fingers. If the epidermis and parenchyma separate easily, the rest of the leaves may be removed from the lye and treated in the same way; but if not, then the boiling must be continued for a time longer. To bleach the skeletons, mix about a drachm of hypochlorite of lime (bleaching powder) with a pint of water, adding sufficient acetic acid to liberate the chlorine. Steep the leaves in this till they are whitened (about 10 minutes) taking care not to let them stay in too long, otherwise they are apt to become brittle. Put them into clean water and float them out on pieces of paper. Lastly, remove them from the paper before they are quite dry, and place them in a book or botanical press.

[The above minute instructions may be acceptable to some. There is no novelty, however, in the use of alkaline solutions, which we have seen used for this purpose, by lady friends, at least fifteen years since.]

383. An Old Acquaintance.—We recollect clearly that one of our first experiments, when beginning to dabble in chemistry as a young boy, was the following, which we now find revived as a practical application:

"Take an oblong vial, put in a piece of phosphorus about the size of a pea, upon which pour some olive oil, heated to the boiling point, filling the vial about one-third full, and then cork the vial. To use it, remove the cork, and allow the air to enter the vial, and then recork it. The whole empty space in the bottle will then become luminous, and the light obtained will be equal to that of a lamp (?). As soon as the light grows weak its power can be increased by opening the vial and allowing a fresh supply of air to enter. In winter it is sometimes necessary to heat the vial between the hands to increase the fluidity of the oil. Thus prepared, the vial may be used for six months. The contrivance is now used by the watchmen of Paris in all magazines where explosive or inflammable materials are stored."

384. (?) The Engineer Corps of the New York Dock Department, while engaged, April 25, in taking "borings" of the composition of the river bottom off Pier 51, North River, pierced, at a depth of 80 feet, a subterranean reservoir, the water ascending the tube with such force as to rise several feet above its mouth. To the astonishment of the workmen, the water was found to be fresh and of an agreeable taste.

385. Seely's "Extract of Hops."—"Within a recent period Prof. Charles A. Seely, a well-known chemist of this city, has patented a method of manufacturing the extract of hops, by the use of which the hop is greatly economized. Several experimental brewings have been made in this city, which have demonstrated that the use of the extract gives a gain of from ten to fifteen per cent. over that obtained by the use of the crude hop. Here is an improvement that promises to open a new and extensive business."—*American Artisan.*

[This item refers to an invention involving the very remarkable and unexpected observation, first made by Prof. Seely, that "gasoline," or rather the petroleum hydrocarbons that distil below 120 deg. F., dissolve out the whole of the medicinal virtue of the hop, with none of the useless matter. This extract is far superior to the hop itself. We are told that thousands of barrels of beer, instead of mere experimental brewings, have now been made with it, and highly approved of by skilled experts.—Ed.]

386. "Hot Boxes": An Ingenious Suggestion.—*To the Editor of the Scientific American:* My ingenious and able colleague, Mr. Mayer, has recently been experimenting, during the course of an interesting investigation, upon a number of substances which change color on raising their temperature, and regain their original hue when cooled.

Iodide of mercury is one of these substances, and he suggests that if a bearing, to which access is difficult while machinery is in motion, or which, for other reasons, cannot be conveniently reached by the hand and its condition thus known, be painted with iodide of mercury or some such material of changeable color, its darkening when the journal heats, may make it a valuable indicator. Its change—from bright red to black at about 70 deg. C.—would attract attention from a considerable distance.

I have sent you this suggestion, as I have no doubt that it may prove very useful to some of the readers of the *Scientific American*. R. H. Thurston.

Stevens' Institute of Technology, Department of Engineering, Hoboken, N. J.

[With regard to this, it must first be pointed out that the red mercuric iodide does not turn black, but *lemon yellow*, by heat. Ingenious as the notion assuredly is, it is nevertheless necessary to remark that the change is not a gradual one, as seems implied in the above, but takes place completely and suddenly, at a definite temperature, like the melting of a metal, for example. Moreover, the color does not necessarily, or at once, return of itself to red again on cooling, but only on rubbing with a hard body. Would not some kind of an alarum, dependent on the fusion of an alloy attached to the journal, promise better in practice?—Ed.]

[Since the above has been in type, we have received the Jnly number of the *Am. Jour. of Science*, with Prof. Mayer's own paper which we shall condense for the next issue. He does not propose to use the binoxide of mercury, but the double iodide of mercury and copper, which does turn dark-brown or nearly black.—Ed.]

387. Varnish to Imitate Ground Glass.—To make a varnish to imitate ground glass, dissolve 90 grains of sandarac and 20 grains of mastic in two ounces of washed methylated ether, and add, in small quantities, a sufficiency of benzine (?) to make it dry with a suitable grain—too little making the varnish too transparent, and excess making it crapy. The quantity of benzine required depends upon its quality—from half an ounce to an ounce and a half, or even more; but the best results are got with a medium quality. It is important to use washed ether, free from spirit.

Gas-Purification.

The following Specification, filed in England, July 4th, 1871, though the patent was never completed, seems to contain suggestive points, and to be worthy of transcription. The inventor was William Thomas Walker, of the firm of C. and W. Walker, of the Midland Iron-Works, Donnington, near Newport, Shropshire, and 8, Finsbury Circus, London.]

"These improvements refer to the purification of coal gas from ammonia and other impurities. For the removal of ammonia from coal gas, apparatus called scrubbers, consisting in most cases of circular vessels charged with coke, have heretofore been used. The unpurified gas entering at the bottom, and passing upwards through the interstices of the coke while water or ammoniacal liquor is poured down from the top. Various other methods of bringing coal gas in contact with water or ammoniacal liquor have been tried, but all have proved more or less imperfect.

The difficulty of entirely cleansing gas from its ammoniacal and other impurities, without causing very heavy and destructive back pressure, has occupied the attention of scientific men for years past. The effectual spreading of the water or ammoniacal liquor at the top of the scrubber, so that the gas shall not escape coming into perfect contact with it, has always proved a subject of the utmost difficulty. The "Barker's mill" was found to be a very useful means of spreading water, but the necessarily small holes in the horizontal arms soon choke up, sometimes in two or three days only, and thus it soon became impracticable and unserviceable. The same objection applied to all tubes having small holes. All means of spreading or distributing water or ammoniacal liquor have hitherto, from various causes, universally, more or less, failed in accomplishing the object described.

"The first part of this invention is a new means invented for effectually spreading the water or ammoniacal liquor to cover or saturate the entire area of the coke, and from experiments made this is accomplished in a very facile and novel manner. On the top of a circular scrubber, about 10 feet diameter, and about 20 feet high inside the body, a circular or square vessel is fitted as a capacious water tumbler, which receives the water or ammoniacal liquor from the service-pipe, and when one half or division is full it falls over and discharges its contents into the upper vessel, from whence it rushes down a pipe, which is placed in a vessel sealed downwards to prevent any back escape of gas from the inside of the scrubber.

"This latter vessel also supports a perforated dash-plate, to be afterwards described, and opens upwards into a larger vessel, which has holes all round its circumference, which are of sufficiently large diameter to prevent their being choked or stopped up. The perforated dash-plate referred to covers the entire surface of the coke to within a short distance of the scrubber sides. This circular plate is perforated all over with holes sufficiently large enough to prevent their being choked, and inclines downwards to its outer circumference.

"The action of the apparatus is as follows: The half division of the water tumbler having been filled by the water or ammoniacal liquor, and holding, say, about two cwts. of water or liquor, tumbles over and discharges the liquor with a rapid rush down the pipe, which fills the perforated vessel, discharging the liquor with considerable force out of the holes in its circumference on to the dash-plate beneath, upon which, from the height, it descends with considerable violence, and the dash-plate, being of thin wrought iron, shakes and trembles like the skin of a drum, and breaks up the water or liquor into minute particles, scattering it in all directions over the surface of the perforated dash-plate and against the sides of the scrubber, thoroughly breaking up the water, and distributing it all over the area of the coke.

"It has also another important action or effect. When the perforated vessel is about full of water or liquor, it is arranged to discharge it by preference to within about 9 inches of the sides of the scrubber, breaking up the water and dashing it against the sides and extreme edge of the coke. As the pressure in the vessel gradually declines, the streams of water draw inwards towards the middle of the scrubber, and thus by a natural self-acting process the complete area is covered by the falling water.

"The invention described also enables any quantity of water or liquor to be used, as the tumbler will work at any required speed, either very fast or very slow, as the quantity of gas to be purified increases or diminishes; also by a novel method of shifting or removing the centres of the bearings it will work, discharging its contents in any required quantity, either one-eighth, a quarter, half, or three-quarters full, or any other quantity that may be required. Clean water may also be used entirely, or the ammoniacal liquor may be worked over and over again until it acquires any required degree of strength.

"The bottom of the scrubber is a steep cone or descent from the centre to the sides, or from the sides to the centre, thus either concave or convex. This constitutes a simple but important part of this invention. For directly the ammoniacal liquor has passed through the coke, by which time it has become a strong ammoniacal solution of a highly volatile character, it at once runs down the sides of the conical bottom clean out of the scrubber entirely.

"In all scrubbers as hitherto made the bottom has been quite flat, with the flanges of the bottom plates projecting upwards from the bottom, and a considerable quantity of the strong ammoniacal liquor has in consequence been lying in the bottom of the scrubber. From observations and experiments made, the extremely prejudicial character of this construction has been discovered, and it has been found almost impossible to thoroughly purify gas from ammonia from this cause. The great strength the liquor has attained by the time it has reached the bottom of the scrubber has been already explained.

"Ammoniacal gas, as is well known in chemistry, is exceedingly volatile and diffusive. It is always very difficult to confine it. It has been found that it speedily releases itself to the extent of 35 to 40 per cent. of its strength in the bottoms of the scrubbers, and thus the action of the scrubbers as heretofore made has been half neutralized by the rapidly ascending volumes of ammoniacal gas from the ammoniacal liquor in the bottom of the scrubber ascending and diffusing upwards through the coke again, thus constantly spoiling the purification after it has been effected.

"It is therefore in order to overcome this difficult

that the steep conical bottom has been invented, as it causes the liquor to discharge itself at once into the proper wells or tanks prepared for it on the gas works directly it has passed through the coke and reached the bottom. This causes the action of the scrubber to be developed and preserved, and to retain its purifying action and power constantly, all the prejudicial counteracting forces being removed. It is preferred to make the conical bottom of smooth cast-iron with flanges beneath."

The Memphis Gas Imbroglio.

We have been kindly favored with some documents relating to this case, and as some important points are involved that have not before come up prominently, so far as we are aware, on this side the Atlantic, relating to distribution of gas by competing companies in the same district; we propose to make considerable extracts from the testimony and argument. The controversy is between the old Memphis Gas-Light Company, chartered by Act of the Legislature of Tennessee, December 31, 1849, and the Memphis Gayoso Gas Company, constituted by the same Legislature May 23, 1866.

This latter company proceeded in 1867 to lay their independent mains in the streets of Memphis. We gave, in fact, in our issue of May 2d last, p. 139, an account of the inauguration ceremonies of the new company, which comprises some information regarding the history of the case. It would appear, that the work was stopped after four or five miles had been laid, by injunction granted to the company already in possession. After four years of litigation the injunction was dissolved in November last, and the work proceeded with. The subsequent history of the litigation we shall quote from the Memphis *Public Ledger* of June 28th:

"The public will recollect the very notorious gas case of Judge Heiskell's court, in which Messrs. J. M. Williamson and others were sued by the Memphis Gayoso Gas Company for $400,000 damages for maliciously conspiring with Thompson Dean against said Gayoso Gas Company. It will be further remembered that the jury rendered a verdict in favor of the said Gayoso Gas Company for $300,000. The defendants moved for a new trial and arrest of judgment. The court refused the motion for new trial, but arrested the judgment, and the case went up on appeal to the Supreme Court, at Jackson. On yesterday a decision was rendered, in which the court held: That the arrest of judgment was erroneous, but that a new trial should have been granted, and that the Circuit Judge erred in his charge on the subject of "probable cause," and because of rejection of evidence in mitigation of damages. The practical effect of this decision is to annul and set aside the $300,000 verdict, and place the parties exactly where they were before the trial began. Concerning the question of exclusive franchise, the case grows very interesting. The Supreme Court held that tee charter of the Memphis Gas-Light Company is not exclusive except as to the occupancy of so much territory as is necessary to the reasonable exercise of its franchise; and that the new company's right is subject to the *prior* right of the old company to occupy the necessary territory. Although it seems that no exclusive privilege is granted by express terms of the charter, yet it will become a question hereafter whether or not, from the peculiar nature of the business, a gas company can enjoy the full privilege of its grant when it comes in contact with another company: or, in other words, whether it is not impossible for a second company to locate within the territory of the first company without doing physical injury to the said first company which, as a matter of course, would interfere with the full enjoyment of the franchise first granted. The proof as to this matter was in readiness, but having been taken in another court with reference to another case, it was not admitted, and consequently could not be considered by the Supreme Court. Hereafter all this will, no doubt, be considered the battle-ground to be fought over by the rival gas companies."

It is stated, in other documents transmitted to us, that in the Chancery suit at Memphis "the depositions of forty-two experts in the science" of gas manufacture, have been taken by the old company, their object being, to quote from their counsel, "to show *conclusively*, from the nature of gas works, that it is *impracticable* for two companies to lay down sets of works in the same streets and alleys, in the same city." Two of these depositions, which are from gentlemen of life-long practical experience, and unsurpassed opportunities for the same, we shall make room for:

Deposition of Gen. Charles Roome, *President of the Manhattan Gas-Light Company, New York City, November 15th*, 1870.

I am 58 years of age. I reside at No. 47 west 33rd street, New York city. I am a gas engineer, and have been connected with the Manhattan Gas-Light Company of the city of New York for about thirty-three years; was its engineer for several years, and am now its president. I am acquainted with the science and practical occupations of my pursuit. I acquired my knowledge by study and experience, and I believe that I understand the business of gas making and the management of gas works. I do not know how it is possible to determine the future points of greatest demand for gas in a growing city.

Having a system of distributing apparatus located in the streets, adapted to present demands, I do not see how it is possible now to determine how many additional pipes, mains and conductors, or what sized mains or pipes it will be necessary to lay in any given street or streets, as they now exist, or to determine what width or depth of such streets it will become necessary to occupy with mains, pipes or conductors of gas, for the future supply of the city.

All gas, when it leaves the works, is more or less charged with moisture, which condenses in the street pipes, and has to be drawn off. This, of course, can only be done at the lowest points. It is therefore necessary that the pipe should have an inclination toward these points, otherwise they would become filled in time, with water, which would stop the flow of gas

In any district, where the topography presents a depressed locality, the mains ought to incline to the point of depression, and be there drained by means of drip-boxes.

The street mains of a gas company form an underground network corresponding with that presented on the surface by the streets. The plane occupied by the mains of one company cannot be occupied by those of another. Street mains are not laid at a uniform depth from the surface; the depth varies according to circumstances. The service pipes are elevated or depressed, according to the depth of the main and the distance to which the gas has to be conveyed. The inclination may be 65 deg., according to circumstances—rarely as much as that. We always try to throw the condensation back into the main, but are sometimes compelled to draw off the condensation in the houses.

In a long line of street compactly built up with houses supplied with gas, there are service pipes every few feet, and with various inclinations; and they *occupy or cover the available space between the houses and the mains, from quite on a level with the street main to near the surface.*

It is impossible to interlace mains with service pipe, without *injury or destruction to the latter*. The mains of the second company, if laid between the mains of the older company and the houses, would prove a hindrance to the older company in the laying of service pipes, and would render the supply more expensive. It is not possible for two gas companies to occupy the same street with their mains, etc., in the same plane.

It is not practicable for a second gas company to locate its pipes and mains in streets already occupied by the distributing apparatus of another company, and to place its mains, etc., at the same or less depth than that occupied by the older company, without doing injury and mischief to the mains and pipes of the older company, and without lessening the advantages and opportunities in the streets for the extension, repair, or changing of the pipes, mains, etc., of such older company. It is not possible for two gas companies to simultaneously occupy the same streets, with equal advantages and facilities for supplying the same houses with gas.

It will depend upon the manner in which the work is done whether it will require a long series of years to elapse before places of made ground—the soil being earth, and free from stone—become compact and cease to settle or sink. There must be some settlement, even with the utmost care.

If, from *any* cause, the ground beneath the main pipes settles, the pipe must be damaged. Sometimes the joints are drawn, sometimes the pipes break. It is almost impossible to fill in ground so that it will not settle.

It is not feasible for a second company to invade the streets occupied by an older company, and attempt to occupy the same with pipes, gas mains, etc., at any reasonably greater depth than that occupied by the main pipes, etc., of the older company without damage thereto. It is not practicable to do so at any depth without doing injury and mischief to the older company in the matter of its pipes, mains, conductors, etc.

An established Gas Co. cannot yield equal privileges and advantages of occupancy of the streets containing its distributing apparatus to another company, or similar privileges, subordinate to the older company's choice or dictation, without imparing its own privileges, increasing its difficulties, enhancing the cost of its subsequent improvements, extension or repairs, and decreasing its facilities for supplying consumers with gas, curtailing its advantages, and rendering its pipes, mains, etc., liable to material damage and frequent injury; the precise location of which may be difficult of detection, and the amount an extent incalculable, except by experience.

My observation and experience show that competing gas companies cannot occupy the same streets without injury to each other's means of distribution, and without inconveniencing the public.

Pipes must be drained of condensation. They must be laid with an inclination towrrd the drip-box, and they must have a solid foundation to preserve their requisite position or necessary line of inclination.

A new company attempting to occupy the same streets already occupied by another company must necessarily inflict material injury and damage to the older company's means of distribution. Competing companies sometimes damage each other by tapping each other's pipes. The New York Gas Company, and the Manhattan Gas Company competed in Grand street, in this city, and we found in many cases that they were supplying their customers out of our mains, and that we were supplying ours out of theirs. We therefore purchased from them all the mains they had laid on our side of the street and removed them. I have known the same thing to occur in London, leading to law suits. I believe there are now no competing companies in London, each company confining itself to a separate and distinct district.

In my judgment, it is impossible for two gas companies to supply the same houses with equal advantage. Experience has shown that competing companies are not over nice in protecting the poperty of each other; that damage and danger are the consequences of such competition. Sooner or later, one company has to yield to the other. They may compromise their difficulties by purchasing, one from the other, a portion of the ground occupied in common, and then confine themselves to separate districts, thus imitating the course pursued in London, Liverpool, New York, and elsewhere.

Deposition of William W. Greenough, *of Boston, on the 3d of October*, 1870:

My name is Wm. W. Greenough—am 52 years of age—reside in Boston—am agent and treasurer of the Boston Gas-Light Company, which position I have occupied since February first, 1852, during which period I have also been manager and engineer of the Company, and have become acquainted with the practical and scientific operations of the profession by study, practice, and examination of numerous gas works, at home and in Europe.

It is not possible to determine approximatively, in a new and growing city, the future points of greatest demand for gas, inasmuch as the localities of greatest consumption not unfrequently change.

It is not possible to determine, at the present time, what additional mains may be required in the future, in any given street, or to fix the absolute level and positions of future gas mains.

In the distribution of gas, perfect drainage of condensation can only be secured by regular inclination of the mains and the drainage boxes. Otherwise it might stop the flow of gas through the mains, or produce irregularity and jumping in the lights supplied.

In a depressed locality the mains should incline to the point of depression, and be drained of their condensation by means of drip boxes.

A gas company having selected the place of the underground network of its distribution, a second company cannot occupy the same plane in the same streets.

Mains are originally laid at a uniform depth, but service pipes dip to the main on an angle proportioned to the distance of the building to be supplied from the main, which may be anywhere between one degree and sixty-five.

In compactly built streets of houses supplied with gas, service pipes are laid to these houses at short distances, occupying the space between the street main and the highest point of entry to each building supplied. Another street main could not be interwoven among these service pipes without injury to them.

A second street main belonging to another company must necessarily interfere with the uses of the first main, increasing liabilities to accident, and adding to the expense of the old company.

Two gas companies cannot occupy the same plane of distribution in the same streets.

A second gas company cannot locate its mains in the same streets without injury to the distribution of the first company, and increasing the difficulties of extension and repair.

It is not possible for two gas companies to occupy the same streets with equal facilities for gas supply.

It requires a long time for made ground to become compact, or similar to original soil.

Gas mains are frequently broken by the settlement of the earth underneath them, especially in made ground.

A second company could hardly lay mains at a greater depth than those already laid in the same streets without injury to the first set.

I have observed that competing gas companies cannot occupy the same streets without injury to each other's mains of distribution, as well as great public inconvenience.

It is not easy to determine the precise point of a stoppage on a line of street main, and excavations for that purpose are frequently expensive.

Perfect drainage is necessary in any proper distribution of gas, and all mains must be laid with an inclination to the drip-boxes.

There is no competing company in the city proper, consequently, I have no experience of my own as to all its absolute effects. Other charters for the supply of the same territory have been granted by our Legislature, but the parties owning them could not obtain permission to locate works or take up streets.

The reasons already given for the inexpediency of competing companies occupying the same streets seem to me perfectly ample.

[We shall close with some brief excisions from the argument before the Supreme Court of Tennessee, at Jackson, April, 1872, by Mr. Pillow, counsel for the Memphis Gas-Light Co. in the case above referred to, which resulted in the setting aside of the verdict of $300,000 for the new Company, and the restoration o the *status quo ante bellum.*]

To entitle the plaintiff to recover, it is essential that it shall show—

First, That by its charter it had a domicil in the city of Memphis, with the right to use the streets, lanes and alleys to lay down its works for the exercise and enjoyment of its franchise.

If the Gayoso Company had no such right by its charter, it cannot maintain a suit to recover damages against these defendants for enjoining that company from laying down its mains, conductors and service pipes in the streets of Memphis.

In other words, the right of the plaintiff to recover in this suit must be shown to have existed when the injunction was issued, and that right could only exist by its charter having authorized the construction of its works in the city of Memphis.

Second. If the court should be of opinion that the Gayoso Company had such domicil, then we insist that the Memphis Gas-Light Company had an older and prior right to the use of these streets and alleys under its charter; and the old company having already built its works, and being in possession of the streets and alleys and in the enjoyment of its franchises, if both companies could not occupy the same streets, the new company must, from necessity, work in subordination to the old company, and its rights must give way; and if it had no right to occupy the streets with its works, it could incur no damages by being enjoined from prosecuting its works.

* * * * * * * * *

To determine this question of domicil of the Gayoso Company, we have only to refer to the charter of this company. If the right to build its works in Memphis are not to be found in that grant of its powers, the right does not exist.

It is a well-settled rule of construction in all charters of incorporation that the charter must be *strictly construed*—that there are no presumptions in favor of powers not given by express grant—and none to be inferred.

[He then quotes the different Acts of the Legislature relating to the two companies.]

Now where is the provision in the charter of this corporation which *locates* its gas works at Memphis? It is called "The Memphis Gayoso Gas Company," but that is simply its corporate name. Its name gives it no power. It confers upon it no rights. It simply designates the name by which it should be known, in which it might sue and be sued, purchase and receive, or sell and convey. Without a corporate name it would be incapable of doing any corporate act, as it would have *no identity*, as a legal entity, and no power to do any act which would bind its corporators or stockholders. But unless its charter contained some *provision designating* the *place* where it was to build its works, it would have no such power, and its charter would be wholly inoperative for want of this *designation*. Without designation of the place where it could lay down its mains, conductors, and service pipes, it would be fatally defective, and it could not locate *these* on the streets, alleys and lanes of Memphis,

He then quotes authorities—

Showing that the corporation must have a PLACE *designated in its charter*, so as to localize it, and where it is intended to build gas works for lighting a city, this designation involves its AUTHORITY to build, and use the streets of that city for its works. If no such EXPRESS POWER is given, localizing its works, it is a *cosmopolite* corporation, without any power to locate them anywhere. It is like a man without a domicil, or home, or citizenship.

* * * * * * * * *

This Gayoso Company squatted down in Memphis, and went to work tearing up its streets and alleys, laying down its mains, conductors, and service pipes, and greatly deranging and damaging the *works* of the Memphis Gas-Light Company, without any authority in its charter for so doing, and without the semblance of right. In doing so it was a trespasser upon the rights of the Memphis Gas-Light Company, which had built its works, occupied those streets and alleys with its works, and was fulfilling the obligations imposed by its charter, and its duties to the public.

To put a stop to this, Thompson Dean, a large stockholder of the Memphis Gas-Light Company, who was a citizen of Ohio, filed his bill in the Circuit Court of the United States, praying for and obtained an injunction restraining the Gayoso Company and procured the defendants in this suit to become his security on the injunction bond. The Gayoso Company brings this suit against the persons—these securities of said Dean—charging a conspiracy and confederacy to damage the Gayoso Company, and claiming damages to the amount of four hundred thousand dollars.

These defendants—under the plea of *not guilty*—defend themselves by showing that the Gayoso Company, as a corporation, was without authority to build its works in Memphis.

* * * * * * * * *

My second proposition is, that from the nature of gas works requiring mains on each side of each street, and conductors and service pipes running from these into each house on each side of each street, requiring these *mains* and *conductors* to be laid everywhere with *inclination* in the *grade*, so as to pass the condensed gas water down to *drip-boxes*, requiring these inclinations and grades to be on *planes* without elevations, or depressions, or upward curvatures, and that the slightest curvature or depression would fill up the pipes with water and stop the flow of gas through the pipes; and that all these had to be so laid as to be accessible for purposes of repair or re-adjustment, and of extension by the introduction of new conductors at cross streets and service pipes to supply new houses everywhere as the city is built up and extended. When all this is known and understood, your honors will perceive that there is a network of pipes, or web of pipes on each street (like the web of the spider hung up between two supports), under ground, which would render two sets of distributing apparatus in the same street and alley IMPRACTICABLE.

* * * * * * * * *

Now let this be doubled by a second set of mains, conductors, and service-pipes, which must be laid down in like manner and be kept in like repair, and we would have a double web and net work of pipes, which would render it utterly impracticable for either set of works to be kept in repair or in working order, and would mar, if it did not destroy, the enjoyment of the franchise of both companies, and put it out of the power of either company to fulfill its duties to the public. Two such works would destroy each other.

* * * * * * * * *

These works are all constructed, put into operation, and worked under known physical laws; and it is about as impossible to put two such systems of distributing apparatus into operation, and work them successfully in the same streets and alleys as it would be for a surgeon to put into the human frame another heart, with trunk, arteries, and branch arteries extending into the flesh of all parts of the body of a man, and to have both hearts and both sets of arteries work in harmony and perform their appropriate functions of supplying the flesh, bone and every other part of the body as it wasted under the laws of our being. The heart and the arterial skeleton of the man, as we see it in surgical science (in *colored wax*) is not an inapt representation of the gas laboratory—the *mains*, *conductors* and service-pipes which spread (underground) over the streets of a city lighted with gas.

Could a second heart, with a second set of arteries, from the largest to those to be seen only with the aid of the microscope, be put into the body of a man and all made to work in harmony and perform their proper functions? The great Artist who made man might introduce two such systems into his body and make them work in harmony, but certainly no scientific surgeon, however skilled, would attempt to do so; and yet the one would be about as practicable as the other.

* * * * * * * * *

The science of law recognizes the existence, *principles* and *truths* of all *other* sciences. It is itself a science which adjudges the rights of all parties in other sciences. Your honors may not in fact know much about this physical and practical science, but the *law holds you* to know *all* about it. You are presumed to have *all knowledge* which becomes material in adjudging the right of others. Under this view of your presumed knowledge, I introduce to your honors four eminent scientists and experts, to give you information of the principles, character and nature of this science, which are involved in this litigation, and by which your decision must be controlled. The rights of these litigants depend upon its principles and truths. I present you these sworn statements. I do not offer them as evidence of *facts*, affecting the rights of these litigants, but as furnishing knowledge material to the adjudication of the rights of these parties. They are brought to the attention of the court as law. All such knowledge is received by the science of law, of which your honors are experts.

[Mr. Pillow states so well, in this last paragraph, the true and common-sense principle and doctrine regarding scientific testimony, that we commend the passage to that school, of recent origin, comprising some patent lawyers, which has adopted the cry that scientific experts should be altogether excluded from courts of law, because sometimes "doctors disagree."]

Oxhydrism.

Dr. Adolph Ott delivered recently to the New York "Liberal Club," a lecture on the new (?) oxygen light. We extract a few sentences:

"This discovery, which was first brought out at the Exhibition at Paris in 1867, is due to Mr. Tessie du Mothay."

* * * * * * * * *

"Formerly the new oxyhydrogen light was produced in a manner similar to that of the calcium light, by bringing cones or cylinders of zirconia (whence the name zirconia light) into a glow, by the combustion of oxygen and ordinary gas. The cylinders are now dispensed with, the gases being consumed in burners terminating in two concentric pipes. The inner one serves for the conduction of oxygen, while the outer pipe is used either for street gas or hydrogen, previously carburetted."

[This seems but a colorable modification of the now ancient "Bude" or Gurney plan.]

"The light thus obtained consists, not of one brilliant point, as formerly, but of a flame."

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"The flame is of a beautiful, but slightly blueish white, and presents much analogy with that obtained from the stars."

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"Far from fatiguing the optic nerve, it only creates an agreeable surprise, when seen for the first time.

"The properties of the oxyhydric light will render it particularly useful for the lighting of streets, parks, squares, railway depots, tunnels, workshops, salesrooms, churches, lecture-rooms, theatres, and other spacious rooms."

In this connection, the following, now going the rounds, may be acceptable.

PARIS SOCIETY OF CIVIL ENGINEERS.—At a recent meeting a report was received from M. B. Thomas, which he had been instructed to make on the new oxyhydric light of M. Tessie du Motay. The report is limited to a technical examination, apart from the economical question, and the following are the conclusions arrived at:

1. Theoretically, the combustion of oxygen does not increase the illuminating power of a given volume of gas.

3. Practically, however, it enables a burner to consume four times the quantity of gas that can be burnt in air, without detriment to the utilization of the light developed. In particular, it realizes the entire luminous capacity of gases, however rich, in almost any quantity.

Consequently, it would be disadvantageous to supply it for ordinary street lighting, on account of the limited consumption of the burners in use.

Its use presents no other great advantage, except as to the beauty of the light, for small burners supplied with very rich gas.

But it is very advantageous—and the more so in direct proportion to the richness of the gases employed—for great centers of light (sun-burners, etc.), where a large volume of gas may be consumed without loss. With reservations in relation to the proportion of the total quantities of gases consumed (oxygen and hydrogen) and the resulting illuminating power developed.

The foregoing is not the only report to be made upon the subject, as M. Leblanc, it is understood, is commissioned to report thereon for the city authorities.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

The Gibson Valves Again.

No. 1.

Gas-Light Improvement Company,
No. 41 Pine Street, Room No. 1
New York, July 5, 1872.

Mr. Editor: Your correspondent "R," in your issue of 17th June, seems to be inclined to underrate the value of the Gibson process of Coal Gas manufacture; for the exceptions that he takes to the tests made at the Peoples' Gas Works, Brooklyn, E. D., on the 20th and 25th March, and on the 4th and 12th April, 1872, are apparently without due consideration.

Upon comparing the tests No. 1 Dips, with No. 1 Valves, we find that the low heats used for the latter, as against the high heats employed for the former, all other conditions of test being, as nearly as possible, equal, caused the valves to yield a gain in the illuminating power of about 21 per cent.; this comparative test, therefore, is a very valuable one to gas works intending to make use of the valves for the special purpose of increasing the illuminating power of their gas from inferior coals; as well as to materially decrease the accumulation of carbon in the retorts.

The comparison between No. 2 Dips, and No. 2 Valves, with all Penn coals, and all conditions of tests about equal, shows the unusually small gain for the valves, of 10 per cent.; the dips having yielded 4.66 cubic feet per pound of 15.45 candle power, or a numerical value of 5.14 cubic feet per pound of 14 candle gas, *a very full yield;* as against the production by valves of 4.94 cubic feet per pound of 16.04 candle power, or a numerical value of only 5.66 cubic feet per pound of 14 candle gas, that is scarcely equal to the ordinary average yield of same coal with valves elsewhere.

For the purpose of ascertaining the relative value of 10 tons coals carbonized by use of the valves and 11 tons by the dip-pipe seal, test No. 3 was made; the retorts with the valves were charged with 160 lbs. and the dips with their usual quantity of 176 lbs., all other conditions of test about equal; the result was, that 10 tons coal with the valves yielded more gas and of a higher illuminating power than was obtained from 11 tons of similar coal with the dips; the aggregate gain by the use of valves being 18 per cent.; as follows, viz:

No. 3. Dips.—95 per cent. Penn, 5 per cent. Grahamite—4.73 cub. ft. per lb. of 15.34 candles; numerically equal to 5.18 cub. ft. per lb. of 14 candle gas.

No. 3. Valves.—95 per cent. Penn, 5 per cent. Grahamite—5.24 cub. ft. of 16.35 candles; numerically equal to 6.12 cub. ft. per lb. of 14 candle gas.

Had the valves, in test No. 3, been used with 150 lb. charges, instead of 160 lb., the excessive candle power would have been utilized, by an increased production of gas per pound of coal used.

The foregoing comparisons were made by special order of the gas company's officials, to determine the actual value of Gibson's improvement; and great care was taken by the engineer and his subordinates, to ensure accuracy in every particular, as is shown by his report giving the results in detail of the trials made.

Very respectfully,
Your most obedient servant,
Wm. H. Grenelle,
Special Agent.

No. 2.

Boston, July 8, 1872.

Mr. Editor: Your correspondent "R," in his communication published in the Journal June 17th, referring to the report on the operation of the Gibson Improvement at the Peoples Works says,: "*It don't matter much to gas companies how gas will figure at a certain higher or lower candle power,*" from which we may infer, that in a series of careful trials such as those made at the Peoples' Works, *he* would not take into consideration the illuminating power of the gas made; and also, that he is not aware that it is in the power of the gas engineer to reduce the illuminating power of the gas he is making, and increase the quantity in the same ratio, simply by varying the weight of his charges of coal, or the temperature of his retorts.

He does not fairly state the result of trial No. 2, which is, of all the trials, the least favorable to the Gibson improvement, and which the report shows afforded a gain in its favor of over 10 per cent.

As regards the "one or more companies removing the improvement, as not working satisfactory," the statement is not true, for in every instance, where a fair trial has been afforded to it, it has given entire satisfaction.

It is true that retort valves were placed in the works at Williamsburgh, under the charge of Mr. Thomas, but before any trial was made of them they were taken down, and at the request of the late Col. Ambrose J. White, they were applied at the Peoples' Works, then under his charge.

Yours respectfully,
J. H. B.

New Compilation on Heating Apparatus.

New York, 119 E. 12th St., June 1872.

Mr. Editor: Please make room for the following circular: As I am preparing for publication a book on American invuntions for heating apartments and dwellings, viz: stoves, hot air furnaces, hot water apparatus, steam heaters and radiators, you would oblige me by sending me at your earliest convenience, illustrations with specific descriptions of your stoves, furnaces, or other contrivances.

Representations of all the various inventions will, of course, be given, but, as they will have to be executed uniformly, I beg to dispense for the present with the sending of any wood cuts or electrotypes.

In order that you may be able to insert the latest improvements you may bring out, I will notify you when the manuscript is ready to be sent to press.

Relying upon your kind concurrence in this matter, and assuring you of my best attention to your communications, I remain,

Very respectfully,
Adolph Ott.

[We recommend to those of our readers who are interested, to comply with the request of Dr. Ott, who is a gentleman in every way competent to collect and shape the class of materials he refers to, in such a manner as to form a work of real and lasting value to this branch of Technology.—Ed.]

The Sperm-Equivalent Discussion Continued.

Newark, N. J., July 8, 1862.

Mr. Editor: We notice in your number of July 2, a communication signed "Y," intended as a refutation of an article in your issue of May 16, entitled "Practical Suggestions on Candle Power."

We are much indebted to "Y" for telling us that coal is an inanimate substance, and that to produce gas from it, fuel, labor, lime, etc., are required; a fact by the way that has taken "Y" from four to six weeks to find out. As we never doubted it, denied it, or inferred otherwise, we fail to see anything in the communication, except it be a great deal of rudeness, and the endeavor to show the Grahamite worth $31.42 per ton, Wollongong $150.79, and Naphtha $245.66 per ton, or 62 cents per gallon! These efforts of "Y" induce us to believe that he is much more interested in selling than buying these high priced enrichers; but when he pretends to instruct us, as to the cost of making a thousand feet of gas, the application of the old story about the painter and the cobbler, becomes too evident.

"Y" makes the cost of *carbonizing* a ton of Penn coal $12; or, with a yield of 9,500 feet, $1.26 per thousand! being cost of fuel, labor, lime, etc. We will be charitable enough to suppose he includes in the etc. repairs, although he is careful not to mention it.

This is more than double the actual cost, but the more it costs the better for "Y's" calculation; his modesty in doubling instead of quadrupling the cost is commendable. We will take the factor 5; a fair one for the Penn coal, and find the Grahamite drops down to $18.91. Proof:

$$\text{Penn} \quad \frac{6.87-4+5}{554} = 1.420$$

$$\text{Grahamite} \quad \frac{18.91-2+5}{1543} = 1.420$$

X respectfully informs "Y" that he displays great ignorance in naming $12 as the true cost, for fuel, labor, lime, and repairs, to carbonize a ton of Penn coal, and greater ignorance still in the assumption that it costs as much to produce 9,500 feet of gas as it does 15,000; the truth being that each item is greater for the larger production, though not in proportion to the increased yield.

We advise "Y" to revise his equations; to think and read with more care, that he may not misinterpret, and give us figures "absurdly distorted" and "calculated to mislead."

Respectfully yours, X.

Effect of the non-Luminous Constituents of Gas.

Portland, Me., July 11, 1872.

Mr. Editor: I do not wish to trespass too much on your time, or on space in your Journal, but as I think the theory propounded by you in your last issue, under the head of "Our Responsibility," in reply to my communication (published in the same issue) is erroneous, I am constrained to call your attention to it.

You say that 5.11 cubic feet of gas, of 12 candle power, is equivalent to 4.38 of 14 candle, 4.09 of 15 candle, and 3.83 of 16 candle power.

Whilst your arithmetic is undoubtedly correct, I cannot think that this theory would hold good in practice in this case. Ordinary gas, when increased in volume by the addition of only five per cent. of atmospheric air, is reduced in its illuminating power about 33 per cent. Now, if I am correct in this, you must admit that the case is somewhat analogous when proportionately diluted with the non-luminous constituents of caking coals, to wit, carbonic oxide, light carburetted hydrogen, etc., which would certainly be present to a very great extent, if the charges of coal were *run* a sufficient length of time to produce 5.11 cubic feet of gas to the pound of Westmoreland coal, with sealed *dip-pipes*, and the result would be the depreciation in candle power, greatly in excess of the ratio of volume obtained.

We might as well assume that because a six foot burner gives the light of 18 candles, that a three foot burner, under like circumstances, would give the theoretical proportion of nine candles. In practice this is not the case.

In your comments on my communication, you (unintentionally, of course,) misquote one of my statements. I expressed my doubts of the Cambridge works having averaged in 1871, with *sealed dip-pipes*, from Westmoreland coal, 5.11 cubic feet of gas to the pound. In your quotations you do not mention dip-pipes.

But in proof of my sincerity, in the doubts I expressed in my communication of the 12th ult., in relation to this absurdity—although they claimed to have made at the Cambridge works in 1871, an average of 5.11 cubic feet of gas with sealed dip-pipes, and 6.28 with valves (and it is fair to presume that the latter was in general use during the time) I will wager either of those gentlemen you have named as authority for having published the statement referred to, $1,000 to $100, that the Cambridge Gas-Light Company did not sell to their consumers in 1871, an average of 5.11 cubic feet of gas to the pound of coal carbonized, allowing them a loss by leakage and other-

wise of 50 per cent. more than the Portland Gas-Light Company sustained during the same time.

Respectfully,

WM. YORKE.

[Mr. Yorke's letter came too late for comment, which must go over to the next number.—ED.]

Weather Waste of Coal.

TERRE HAUTE, IND., July 8, 1872.

Mr. Editor: Mr. Shipman did not examine closely the statement as to the saving made by the comparison in the article on the "Weather Waste of Coal," or he would have seen that the two statements are substantially the same.

M. Penot says: One kilogram of coal containing 10 per cent of water gave

Gas of good quality	160 litres.
Gas of poor quality	92 "
	252

The same coal previously dried gave

Gas of good quality	240 litres.
Gas of poor quality	92 "
	332
	252
Difference	80 "

The difference of the product of gas, due to the presence of 10 per cent. of water is 80 litres; a little over 24 per cent., and it is to be noticed that the gas of poor quality is the same in both cases, *the whole loss being in gas of good quality.* As your issues for two years last past are May 2, and the article on the "Weather Waste of Coal" is in neither of them,* I take the statement as made in Mr. Shipman's letter, and I find the following as the result:

"That by exposure to the weather the gas yield in quality of coal decreased in one instance	45 per cent.
"While the same sample under cover lost in the same time for gas purposes	24 "
Showing a difference in favor of dry coal of	21 "
A difference between M. Penot and the writer of only	3 per ct.!!

From this I should safely infer that Mr. Shipman, by placing his coal under his close shed, would save from 21 to 24 per cent. in four months storage; and I therefore conclude that, "For most *purposes*, all coals *improve* in value by exposure *under cover*, to a free circulation of air": and that therefore "*it is true* that coal is *improved* for *gas purposes*, by exposure to a free circulation of *air under cover.*"

Besides, the practical experience of all gas engineers and superintendents, as shown by their expending thousands of dollars for enormous sheds under which to store their coal, is a practical proof of the correctness of the above statement.

Yours truly, R.

* Mr. Shipman's reference should have been to our issue of May 16th, 1872, p. 155.

MILFORD GAS-LIGHT COMPANY,
MILFORD, MASS., July 8th, 1822.

Mr. Editor: I would like to inquire through the columns of the Journal, how much gas would be condensed in a new holder not in use, during the month of May.

Yours respectfully,

WM. TARBELL, Sup't.

Killing by Kerosene in Brooklyn.

Our sister city of Brooklyn has had its full share of kerosene horrors, resulting, we suppose, from the fact that it has more than its share of fraudulent and unprincipled dealers, and that its suburban tenements are, many of them, still unsupplied with gas. Indeed, the quality of the gas furnished to consumers in that thriving town is so inferior, that the kerosene light is preferred by many who have the gas service in their houses.

The record of accidents through the use of kerosene has indeed been a fearful one, and we are glad to learn that the city officials are beginning to take action to enforce the law prohibiting the sale of dangerous lighting fluids.

The law of 1865 provides that dealers in petroleum burning fluids must be licensed, and prescribes penalties for every sale without a license. For every sale of petroleum fluid having a flashing point of less than 110 deg. Fahr. it prescribes a penalty of $150. It provides for the appointment of a special warden, who shall have the power to enter any place where kerosene is sold to inspect and test the quality of the article. The salary of this officer is fixed at $1,500 per annum, which is only about one-fourth what it should be. The services of a man who is morally and technically qualified to hold such an office as this are cheap at $6,000 per annum, in such a city as Brooklyn.

We trust not only in Brooklyn, but throughout the country, this matter will receive the attention it merits. Why should we enforce laws against the indiscriminate vending of poisons, and let these scamps who sell dangerous burning fluids prosecute their trade?

There are plenty of safe and good oils in the market, and those who manufacture them are entitled to protection from the competition of the unscrupulous dealers. When it is clearly the interest of ninety-nine hundredths of the entire community to suppress this swindle, we marvel that it is so long tolerated.—*Am. Artisan.*

Gas-Proofing Tissues.

The subject of preparing tissues, paper, leather, rubber, wood, etc., so as to make them impermeable to gas, is one upon which we have much to communicate when the occasion arrives. In the mean time we transfer the following advice from the experienced balloonist, Prof. John Wise:

"There are two ways of preparing linseed oil for balloon varnish. The quick and the slow process. The first is by heating the oil up to a temperature at which it will ignite spontaneously. In order to secure it from burning up it must be heated in an iron or copper vessel, with a lid that can be closed when it begins to emit dense white vapor. If it is desired to have it fast drying, from four to six ounces of litharge per gallon should be boiled in it. This process takes about one hour, and renders the oil thick and tough, giving a good body and glossy surface to the cloth.

"The slow process is to boil the oil from twelve to twenty hours, keeping it at a temperature of about 200° Fah., incorporating with it while boiling half an ounce of sulphate of manganese to each gallon of oil. These varnishes should be applied to the cloth while tolerably hot.

"There are other formularies, such as the incorporation with the oil of some bird-lime, a gelatinous substance made from the inner bark of the white holly. Gum elastic is also used to give the oil body and elasticity. When I desire to make a balloon extraordinarily close, I give it a first coating of compound varnish, made of equal parts of white glue and glycerine.

"I recently filled a balloon at Orville, Ohio, with pure hydrogen, on Wednesday, and ascended with it on Friday following, after it had stood rain and wind, and sailed over a hundred miles with it. This balloon was varnished with the slow process oil, over a first slight dressing of glycerine and glue.

"Coal gas does not exude from the balloon nearly so fast as pure hydrogen. By coating a balloon heavily with either of the above varnishes, it will retain its buoyancy with a loss of about one per cent. in 24 hours, provided it has a capacity of 30,000 cubic feet. When larger, the *exosmose* is comparatively less; when smaller, compraratively greater, owing, of course, to the disparity of cubic contents to surface."

Concession and Condecension.

[The following is not much in itself, but only as indicating a wonderful lowering of tone on the part of one of the eminent gas engineers of the old school. In fact they are rapidly coming round. The extract is from an article by the English engineer, Geo. Bower.—ED.]

I quite agree that we have all a good deal yet to learn in the way of making the greatest quantity and the best quality of gas from a ton of coals; and what with the high price of coals and of other material, and the increased cost of labor, engineers will have to think more than they have done. But, in my opinion, Dr. Eveleigh's method is not the one which will relieve the gas manufacturer. I repeat what I said in my previous letter—that you cannot have both extreme quantity and extreme quality at the same time; but it is a question whether it may not be advisable to employ some portion of the retorts in distilling coal at a low temperature for the purpose of enriching the gas made at a high heat, instead of using cannel coal. But this can only be settled by a satisfactory answer to the question, "Will it pay?"

Whenever we can find an instrument which will register the quantity of *light*, instead of the *volume* of gas, it will then be to the interest of the gas manufacturer to sell *light*; but, until then, he has to sell it by the thousand cubic feet; and therefore, so long as he gives that which Parliament imposes upon him, to give, he would be extremely foolish if he gave more, and therefore I do not see what advantage it is to the manufacturer, under such circumstances, to supply to the public gas of such a high illuminating power, by either distilling coal at a low heat, or by an excessive use of cannel coal.

The direction in which the inventor may exercise his ingenuity is, in my opinion, in the substitution of gaseous fuel for coke, somewhat on the Siemens principle, and in an arrangement by which coals may be fed into the retorts in a continuous manner, without manual labor. If this could be effected, there might possibly be the saving which I stated in my last letter.

A Man of a Thousand.

[The most heroic of human acts are those in which one man opposes his single arm to the tide of public prejudice, and incurs inevitable unpopularity, from a pure sense of justice. Such arms and shoulders should wear ermine; but, alas, we fear that they are the least likely to attain it. We note some remarks made at an indignation meeting of gas consumers, at Swansea, Wales. Let Mr. Rogers go on record in the AMERICAN GAS-LIGHT JOURNAL.]

Mr. Rogers said he had the misfortune to differ from the majority of the corporation on the subject of the supply of gas. It must not be supposed for a moment that he would not hail with pleasure the news that the price of gas was to be reduced instead of being increased; but at the same time he thought it was only fair that both sides of the question should be candidly stated, and that statements should not be made to the public which were calculated to mislead. He thought it was only fair to give the gas company the benefit of the doubt. All commodities had risen in price during the last couple of years, and notably within the last twelve months. Coal had risen to a fabulous price. As Alderman Jenkins had just said, iron was higher than it had ever been before—of course he meant in modern times, as it had been much higher. Now all this told in the manufacture of so important an article as gas for public consumption. The price of coal and of labor had affected, and would continue to affect, the Swansea Gas Company to a most material extent. The products of distillation of coal, to which Mr. Mill had alluded, were certainly not so valuable in this part of the country as in London—as ammoniacal liquor and coal tar were but little used here. There was a fallacy also in what Mr. Mill had said with respect to the price of coke. Although 3½ tons of coal would produce two of coke, still half of the coke produced was used under the retorts at the gas works to distil the gas, so that they had only one ton of coke for sale out of every 3½ tons of coal. At the discussion upon this question, which took place recently in the Council Chamber, he (Mr. Rogers) had endeavored to show that although the price of

[*For continuation see page* 28.]

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AND

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TUESDAY, JULY 16, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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DR. BUCHANAN'S NEW "RETROTHERMAL FURNACE SYSTEM."

A month ago, we introduced a note relating to the extraordinary inventions that have been brought to our attention by Professor J. R. Buchanan, who has been experimenting on a large scale and at heavy expense at Syracuse, in the application of his improvements to the revival of the salt manufacture at that place.

We remarked at the time that these inventions had a wide applicability in other arts besides brine-evaporation, and even in the gas manufacture. Whenever we find ourselves justified in appropriating the necessary space, it is proposed to place before our readers complete specifications of such of these plans as are of application within the specialties of this Journal. Pending this, some further general remarks upon one of them will, we think, be of interest.

Prof. Buchanan's improved furnace, designed as a part of his Monothermal salt-making apparatus, realizes an economy which has long been neglected. In most furnaces, whether for generating steam or for heating solid bodies, the products of combustion carry off by the chimney from one-fourth to one half of all the caloric produced by combustion. One ton of carbon heats say twenty tons of air (half this needed for thorough combustion) and discharges it from the chimney, at the temperature of from 500° to to 1000° Fahrenheit. From 500° to 700° is the usual temperature of the discharge from steam generating furnaces.

Without having had any opportunity for exact observation, we entertain the belief that the gases discharged through the stack of a retort house cannot usually carry of less than 1,000 degrees of heat, and frequently more.

When the fires are not properly managed, the grate not being well covered, or the furnace not tight, the loss is increased by the greater quantity of cold air which passes through, twenty-five or thirty tons being passed for every ton of coal. In furnaces for metallurgical purposes, pottery, gas, etc., the loss is still further increased by the still higher temperature of the discharge from the chimney, which in some cases carries off four-fifths of all the caloric produced. It is obvious therefore that of all improvements in the application of fuel, none can compare in importance with that of Prof. Buchanan, in the retrothermal furnace, which proposes to recover and retain this enormous waste, and which effects this recovery by an ingenious but not very expensive arrangement of the heat recovering apparatus.

Theoretically the recovery may be almost complete, and a realization by this means of nine-tenths of the effect of caloric will produce a greater economy and efficiency in the generation of steam, than has been effected by any improvement of the last hundred years. The efficiency of evaporating or steam generating apparatus at present, ranges from five and a half to nine pounds of steam for one pound of coal. Five and a half is the ordinary production of boiling kettles; nine pounds is the product in boilers of unusual excellence, and seven pounds is about the average production of boilers. The retrothermal furnace raises the amount to twelve and a half pounds, which more than doubles the ordinary production in salt-evaporation.

In all processes in which the heat is not consumed by vaporizing liquids or solids, and in all processes that require very high temperatures, the economy of the retrothermal furnace is much greater than in the production of steam. In pottery, for example, two-thirds of the fuel would be reclaimed by the retrothermal arrangement; and in gas making it would be a very moderate estimate, to say that it would save forty per cent. of the fuel.

These remarkable economies, in connection with the fact, that the combustion is so active and complete as to render it possible to use the most worthless fuel, such as coal slack, or loose, unprepared peat, without any loss, justify the belief that the retrothermal furnace is the most remarkable improvement that has yet been made, in the application of fuel to manufacturing purposes.

ADDERFANG CURIOUS B'HOY

There have lately been communicated to the *World* (the newspaper, not the "wide, wide" affair of like name), some statements by a "Parsee merchant," who has interested himself in gas matters in New York. The uncouth and grotesque name he signs is not *exactly* the above, but is so much less significant of the nature he develops, that we would commend to him the above slight alterations, in order to give his name a certain *appropriateness* to English readers. The "Parsee" part of his individuality is not without its very plain significance. Parsees, being fire-worshippers, are idolaters, and the breaking of another of the commandments, and bearing false witness against his neighbor, doubtless "comes natural." We can throw out to him the consolation that his God will adhere to him hereafter, though probably longer and closer than he likes.

In our Parsee's last effusion, he made a direct attack on the New York Gas-Light Co. We have therefore visited the Office of that Co., to solicit permission to present the *facts*, in order to rebut his fictions. Such permission was however withheld, on the ground, at once recognized by us, that this would be playing directly into his hands; vanity and vulgar notoriety being clearly the animating influences of our fire-worshipper, as is in fact to be inferred from the last name of the name he has adopted. It would indeed be making a mountain of a mole-hill for the New York Gas-Light Co. to condescend to enter into a controversy thus initiated.

We shall throw out therefore but one consideration, of a general kind, so far as his attack on the New York Company is concerned. He concludes that the original capital of this company, which was $600,000, has been increased, by *watering*, to four millions. Admitting his figures, will any man of the commonest common sense adopt his conclusion?

Supposing our esteemed Parsee to have any amount of parsimony, and supposing he had the the money, and supposing he were offered the property (the land, the buildings, the apparatus, the holders, the mains, etc., leaving out of question the "monopoly") for $4,000,000 cash, would he not jump at it. If he *hadn't* the money, and were to go through the highways and byeways with an authenticated offer to this effect, or even of twice this figure, he would not need to go far.

Of course, however, Mr. Parsee would not admit that a Gas Co. has a right to value its property at what it will bring. If a private citizen had made the investment, even if he were to call himself a Parsee, the profitable result would have merely elevated him to the position of a financial potentate and honored benefactor of the Community; but as in this case the operator is called a Gas Company, the original outlay, the enterprise, foresight, work, brains, and business management, are of no consideration at all, and the

vulgar prejudice against the name is taken advantage of to justify newspaper obloquy, and to elevate its author into popularity and notoriety.

It is not at all surprising, but merely consistent, that this writer, out of a superficial and pretentious smattering of the subject, more mischievous than the densest ignorance would be, presents a comparative estimate of the cost of gas to the producer and consumer in New York, and Sheffield, England, in which he does not take into the least account the fact that Sheffield lies in the very midst of a field of coal and iron, and that the materials for making gas, for building gas works and for laying mains, are next door to drugs in that city.

To cut this thing short, as we find we must, let us suggest to our "curious Parsee b'hoy" that, instead of comparing Sheffield with New York, he should employ his adderfangs in a remastication of his calculations, substituting for New York, Pittsburgh, Pa.; where, the *Scientific American* told us last spring, gas is $1.80 per thousand; and which furnishes a fairer chance for comparison with Sheffield. One thing we will whisper to Adder-what's his name; that in energetic denunciation of their Gas Co.'s, and in persistent remonstrances against their outrageous bills, the Pittsburgese are not behind the Manhattanese. Nay: in this noble field of emulation, we feel sure he would find Sheffield itself to hold its own.

THE BRITISH ASSOCIATION OF GAS MANAGERS.

This admirable association has held its usual June meeting, and we are sorry that other matters have obtained precedence, so that we cannot commence reporting in this issue the substance of its proceedings. We had, in fact, prepared an abstract of the Inaugural Address of the President (who is also President of the "Society of Engineers"*) Jabez Church, Esq., but find it must go over to next time.

The meeting continued through the 11th, 12th, and 13th of June 71 new members were elected. In his Inaugural Mr. Church has gone over a great deal of ground, and discussed a multitude of important and interesting topics. He first refers to the absolute success of the Association, the high position it has attained, and the great future before it. Alas, when are *we* to strike out in the upward path that has been so nobly indicated to us by our British brethren? It almost prompts us to sound the tocsin to our apathetic American fraternity, in the very *original* words:

Awake! Arise! or be forever fall'n!

It has scarce come to this yet; but verily, we say, as we have said before, to the American Gas-community, that they *must* organize, unite, make common cause, and bring to bear on the many questions already looming up, a union of hearts, hands, and brains; or perils to their rights and privileges will soon threaten, which will be sore to grapple with. The *moral* influence of such an Association as is now established in the Mother Country, is its most important feature, and will soon make itself felt in that country.

Mr. Church, after some remarks on the sad losses to the fraternity, by the recent deaths of Messrs. John Kirkham, Thomas Livesey, and John Grafton, three of the veteran pioneers of British gas-lighting, proceeds to review the recent labors of the Gas Referees, for which he manifests, as we are glad to observe, a much more just and unbiassed appreciation than some of his compatriots have done. Remarks follow upon the "Eveleigh process" of which more anon, and on the "oxhydric" quackery. Various other subjects, including several recent improvements, are then discussed. Among these, by the way, is an allusion to Coombs's attachment to the stand-pipe, brought forward in this Journal last winter.

The vital question of coal-supply, in Great Britain, next occupies attention; then the attempts of local municipal authorities to usurp and appropriate successful gas works; and Mr. Church closes with some highly sensible recommendations to gas managers, the gist of which is just what we have so often urged on the American fraternity, that less gas should be made by "rule of thumb," and that a larger leaven of scientific, especially of chemical knowledge and skill, should be infused into the art, and that intelligent *experiment* should be more indulged in, instead of being regarded with disdain and even with horror, as likely to lead to innovations upon the time honored and traditional practices of our forefathers.

It would appear therefore that Mr. Church belongs to the progressive school, and we have cause to congratulate our British brethren heartily on the fact that men of this school are now allowed to take the lead. *Tempora mutantur, et nos mutamur in illis.*

* We are here reminded that we owe an apology to Mr. Church, for having passed by in silence his eloquent and instructive address, delivered last winter, on taking the chair of this latter Society of Westminster, which he was kind enough to transmit to the Editor of this Journal. The pressure on our columns, which grows heavier constantly, must be the excuse. The passages relating to gas matters have long been marked for the printer, and in our next we promise to try to edge them in.—Ed.

GAS FOR CALORIFIC USES.

The applications of gas for cooking, heating, and motor purposes, are destined soon to reach, in all countries, a stupendous development. That this beneficent class of inventions has made as yet so little way in America is due to several causes.

Among these are a number of popular errors and prejudices that have prevailed widely, indeed almost universally. Of these probably the most influential has been the impression, adopted without any adequate practical examination of the facts, that the general use of gas for fuel is inadmissible in American towns, in consequence of its comparatively high cost. As we have before pointed out, the fact has been lost sight of here that the average cost of *ordinary fuel* in this country is also almost proportionately high. Nevertheless, it must be admitted that the economy in the use of gas instead of coal, for fuel, is not quite so great here as in England; though, when taken into connection with the other advantages, there is still a conclusive preponderance in favor of gas, as we shall show on another day, soon.

Another of the supposed objections is that if a gas cooking stove is put into the hands of a servant, she will waste gas in a ruinous way. The answer to this is that she cannot by any possibility waste gas the in proportion that they almost all waste coal.

Others of the popular errors that are rife we must leave for future occasions. Our main purpose on this occasion is to quote here some significant and instructive paragraphs from a new edition lately received of the little work of Magnus Ohren, Esq., of the Crystal Palace Gas-Light Company, Sydenham, to which we have before called repeated attention. Mr. Ohren's book was prepared in the first instance for circulation among the consumers of his company, with a view to commend to them the use of gas for calorific purposes. In the introduction to this new edition he says:

Nearly 6,000 copies of the first edition of this pamphlet have been distributed amongst the Crystal Palace District Gas Company's consumers of gas, with a view to increase the consumption—during the summer by the use of gas cooking stoves, and during winter by the use of gas heating stoves, for warming shops, warehouses, bedrooms, halls, and conservatories. At Maidstone, where gas cooking stoves were lately introduced at rent, there are no fewer than 130 cooking stoves in operation, besides a large number of heating stoves, proving the advantage to gas companies of supplying their consumers with gas stoves on hire—say at a rental equal to 5 per cent. per annum on the outlay—the wear and tear of the stoves being amply repaid by the profit on the gas consumed.

The advantages of cooking and heating by gas are so self-evident to the public that since the issue of the pamphlet the consumers of the Crystal Palace District Gas Company have made application for stoves faster than the makers [illegible] busy season of the year. [illegible] necessary to draw the attent[illegible] the consideration of the impro[illegible] and heating by gas, first i[illegible] the experiment of puttin[illegible] into the hands of the c[illegible]

We firmly believe [illegible]y needs that companies in all our larger [illegible]should adopt the plan of supplying gas sto[illegible]at a rent, or some equivalent plan, and disseminate among their consumers, as Mr. Ohren's Co. has done, a knowledge of their advantages, to accomplish quickly the same immense step in advance that we find here announced. Much more soon on this head.

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ROMAN CEMENT.

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[*Continued from page 7.*]

coke—that is of gas coke—had risen from 8s. to 14s. a ton, this bore only a comparatively small proportion to the advance in the price of coal. It was all very well for gentlemen to say that coal in Swansea stands on a par with coal in Cardiff and London. It was not so. The price of local coal for gas producing purposes was, he was informed, from 15s. to 16s. per ton, with a small amount to be added for conveyance to the works. But in order to bring the gas to the proper illuminating power it was necessary to add to the local coal 10 per cent. of cannel coal, which added very considerably to the expense, and raised it rather above the price of coal of equal quality for gas-producing purposes in Cardiff. And while he was on the subject, he might incidentally mention—as showing the foresight of the corporation in times past—that they agreed with the gas company to withdraw their opposition to their bill on condition, among other things, that they would supply gas of an illuminating power equal to 11 sperm candles. If the gas company had adhered to that point, the public would have good cause to be thoroughly disgusted with the quality of the gas supplied, as a large quantity would have to pass through the burner in order to give anything like a reasonable light. But though not bound to do so, the gas company actually supplied gas equal to fifteen sperm candles, which, he was informed, though he did not vouch for it, represented an additional expense to the company of 1s. per 1,000 feet. He knew that, in speaking as he had, he had not taken the popular side, but he was actuated by the wish to give fair play to the gentlemen who had embarked their capital in the gas-works.

Metallic Sodium as an Explosive.

Some years ago, Prof. Wurtz, of New York, instituted experiments on the explosive force of sodium, and obtained some startling results, but the idea of using the metal for blasting purposes did not awaken enough interest to lead to its practical adoption. We now hear that the subject is again revived, without giving Prof. Wurtz the credit that is justly due to him. The calculation upon which the application of sodium is based is as follows: To decompose nine parts by weight of water, 23 parts by weight of sodium are required, and the product is 31 parts of soda and one part by weight of hydrogen. If we employ 46 grammes of sodium, this will evolve, with 18 grammes of water, two grammes of hydrogen, which occupies a space of 22,471.9 cubic centimeters. If the glass ball containing the sodium has the capacity of 50 cubic centimeters it will hold about 46 grammes of sodium; the hydrogen gas from this quantity of sodium will exert an explosive force against the walls of the vessel of 450 atmospheres. The application of the sodium for the purpose of blasting is made as follows: Two glass bulbs of 50 cubic centimeters capacity are blown with a neck of glass between them; one bulb is filled with sodium and the other with water, and between the two is fused a soluble salt. The length of time required to dissolve the salt can be ascertained by experiment, and the connecting tube be made so as not to have the charge fired prematurely. The bulbs, with the sodium below, are let down into the drill hole, the water gradually dissolves up the salt, and thus comes into contact with the metal, and the explosion follows. How far the full force of the sodium can be brought into play is uncertain, as it is necessary that the whole of it should be consumed in decomposing the water, and the explosion may follow before the water has penetrated far enough into the interior for this purpose. Considerable sodium would be apt to be scattered about to set fire to surrounding objects. There is no doubt about the force of the explosion, as we know by experiments that we have tried in a small way, but whether the the thing is feasible on a large scale, is a question which we do not feel competent to answer.—*Journal Applied Chemistry.*

[The material used by me for practical purposes was not solid metallic sodium, but the *permanently liquid* alloy of sodium and potassium, which is obviously not open to the objection suggested by Prof. Joy.—H. Wurtz.]

New Jersey Gas Items.—We learn from the newspapers that the Newark Gas-Light Company has reduced the price of gas from $3.50 to $3.25 per 1000 feet. Also, from the same source, that a gas company has been organized to erect works at Bloomfield, New Jersey.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

JULY 2, 1872

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Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
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American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
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American Cannel	$10 00	@	10 50
Asphalts.			
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Trinidad Bitumen	— —	@	14 05

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Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y ... 5
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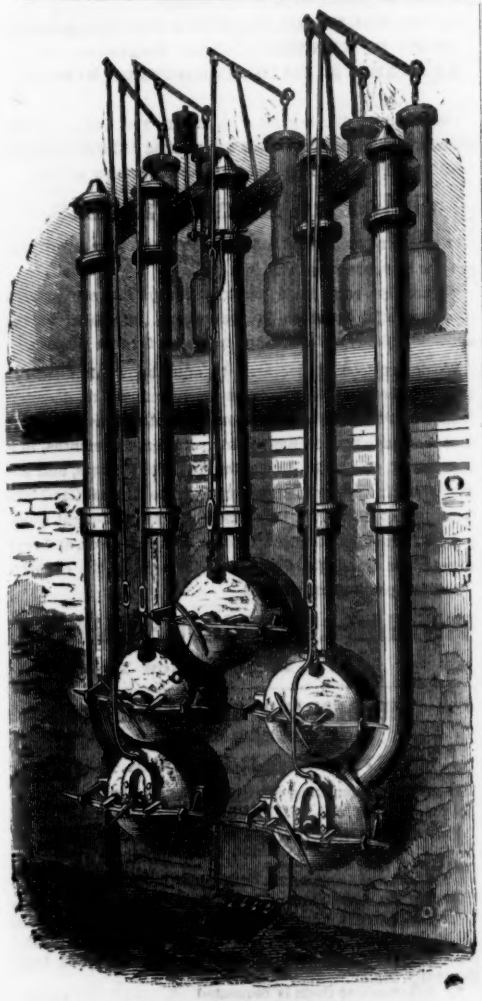

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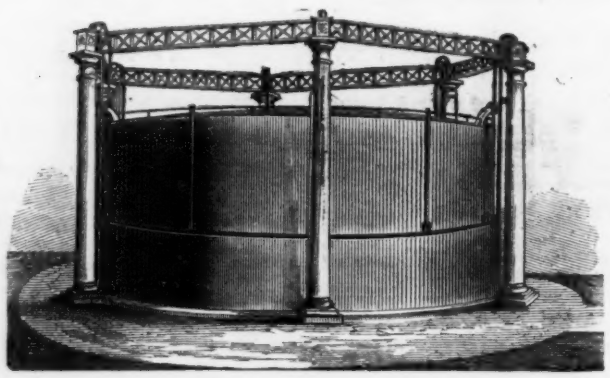

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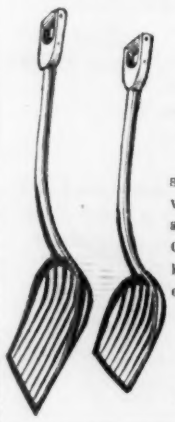

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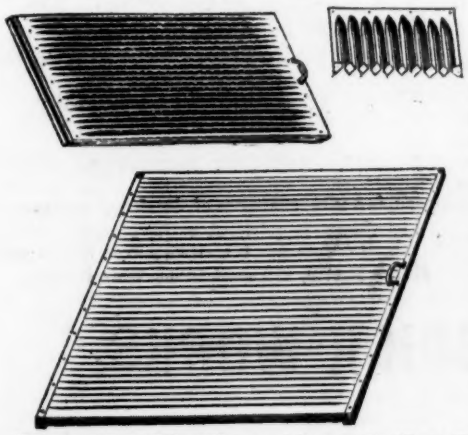

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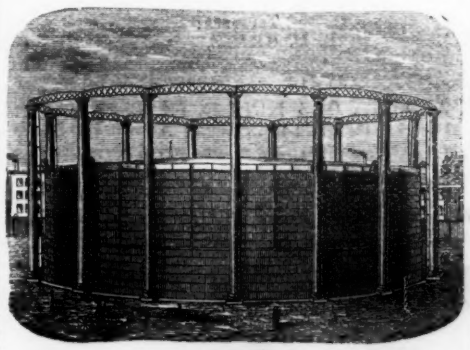

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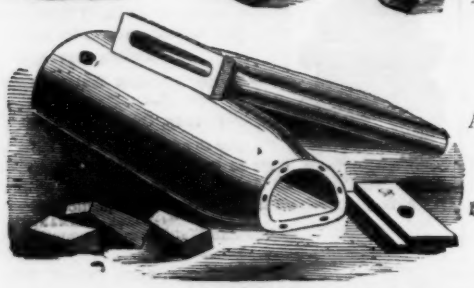

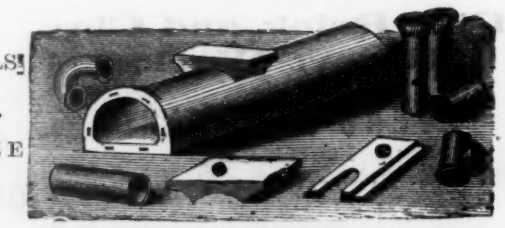

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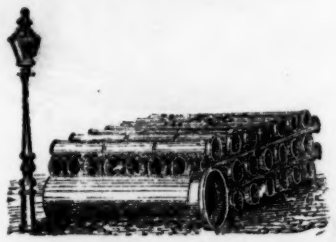

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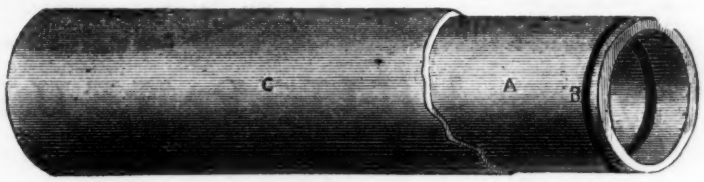

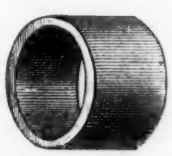

FIG. 2.

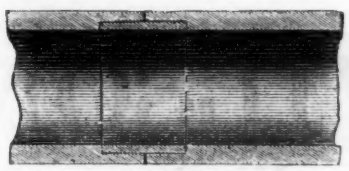

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

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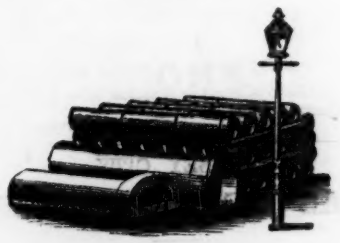

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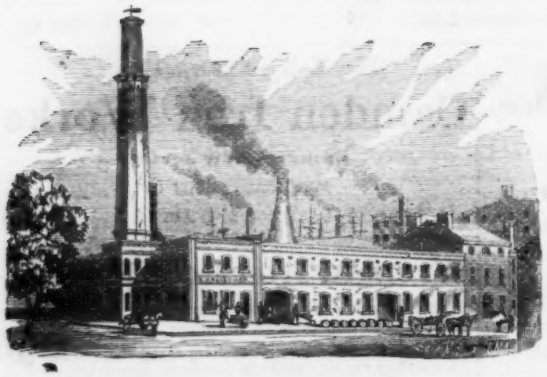

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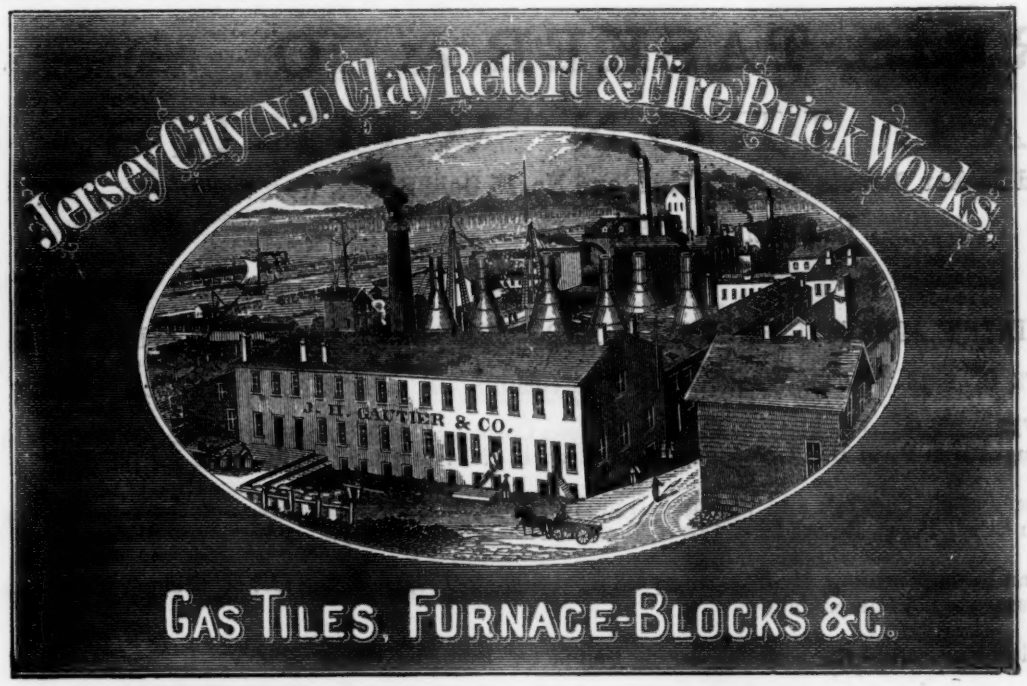

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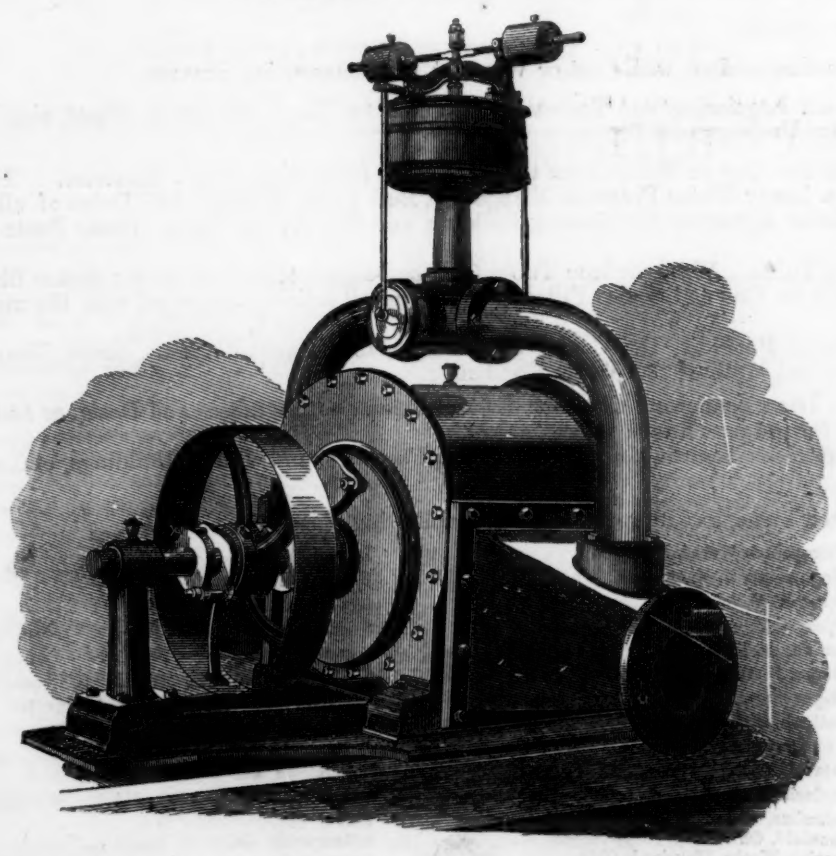

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